

ABSTRACT OF THE DISCLOSURE

Methods, apparatus, and systems are provided to control contraction of the heart. At least one sensing element receives signals indicating electrical activity of sinus rhythm of the heart. Based on the received signals, the progress of contraction of the heart is determined. Based on the progress of contraction, the chamber of the heart may then be stimulated at a plurality of locations. In another embodiment, a plurality of electrodes are implanted in the left ventricle to stimulate at multiple locations in the left ventricle for the purpose of improving hemodynamic performance and increasing cardiac output in a patient who is suffering from congestive heart failure. A pre-excitation voltage may be applied to pre-condition a portion of the heart. A stimulation pulse of increased current may also be applied to improve cardiac output.